

THE FEMALE OF *PHRYNUS EXSUL* (AMBLYPYGI, PHRYNIDAE) FROM INDONESIA

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ABSTRACT. The female of *Phrynus exsul* Harvey is described from Rinca Island, Komodo Island National Park in the Lesser Sunda Islands, eastern Indonesia. The new populations were found in forested biotopes, suggesting that it occupies a range of habitats.

INTISARI. Betina *Phrynus exsul* Harvey dipertelakan dari Pulau Rinca, Taman Nasional Pulau Komodo di Kepulauan Lesser Sunda, Indonesia timur. Populasi baru ditemukan di kawasan hutan yang diduga sebagai perluasan habitat.

Keywords: Rinca Island, Komodo Island National Park, taxonomy, morphology, whip spider

The whip spider genus *Phrynus* Lamarck 1801 currently contains 28 living and two fossil species, with a further 4 species currently listed as *nomina dubia* (Quintero 1981; Armas & Gonzalez 2001; Armas & Viquez 2001; Harvey 2002, 2003; Armas & Gadar 2004; Poinar & Brown 2004; Teruel & Armas 2005) and most are distributed from the southern USA to northern South America (Weygoldt 2000; Harvey 2003). Recently, the first authentic member of the genus to be described from the Oriental region, *Phrynus exsul* Harvey 2002, was named from specimens collected from Flores Island in the Lesser Sunda Islands (Harvey 2002). The presence of a species of Phrynidae within the Wallacean region represents a major disjunction from North and South America where all other members of the genus reside. Harvey (2002) questioned whether *P. exsul* was an endemic Indonesian species or whether it might represent an accidental introduction, but the distinctive morphology suggested that it was not introduced. The only specimens of *P. exsul* available to Harvey (2002) were two male specimens collected from a cave near Labuhan Bajo in Flores Island. The recent collection of additional specimens of this species, including the first available female, from nearby Rinca Island, Komodo Island National Park allows us to ex-

tend the original description. It also allows us to add valuable distributional data and broaden the habitat preferences for this species.

METHODS

The specimens examined for this study are preserved in 96% ethanol and deposited in the Museum Zoologicum Bogoriense, Indonesia (MZB). The general terminology of the morphology and spination of pedipalps follows Weygoldt (1999, 2000), and the terminology of the pedipalps follows Harvey & West (1998) and Harvey (2002). The morphometric measurements follow Quintero (1981). The female genitalia was examined and illustrated by lifting the genital operculum. All observations and measurements were made with a stereomicroscope. Drawings were prepared with the aid of a drawing tube. All measurements are given in millimeters (mm).

The following abbreviations have been used to describe the trichobothria present on each segment (Weygoldt 1970): basitibia (bt = basitibial); distitibia (bf = basofrontal; bc = basocaudal; sbf = subasofrontal; stf = subterminofrontal; sbc = subbasocaudal; sc_{1-x} = series caudal and trichobothria present; sf_{1-x} = series frontal and trichobothria present).

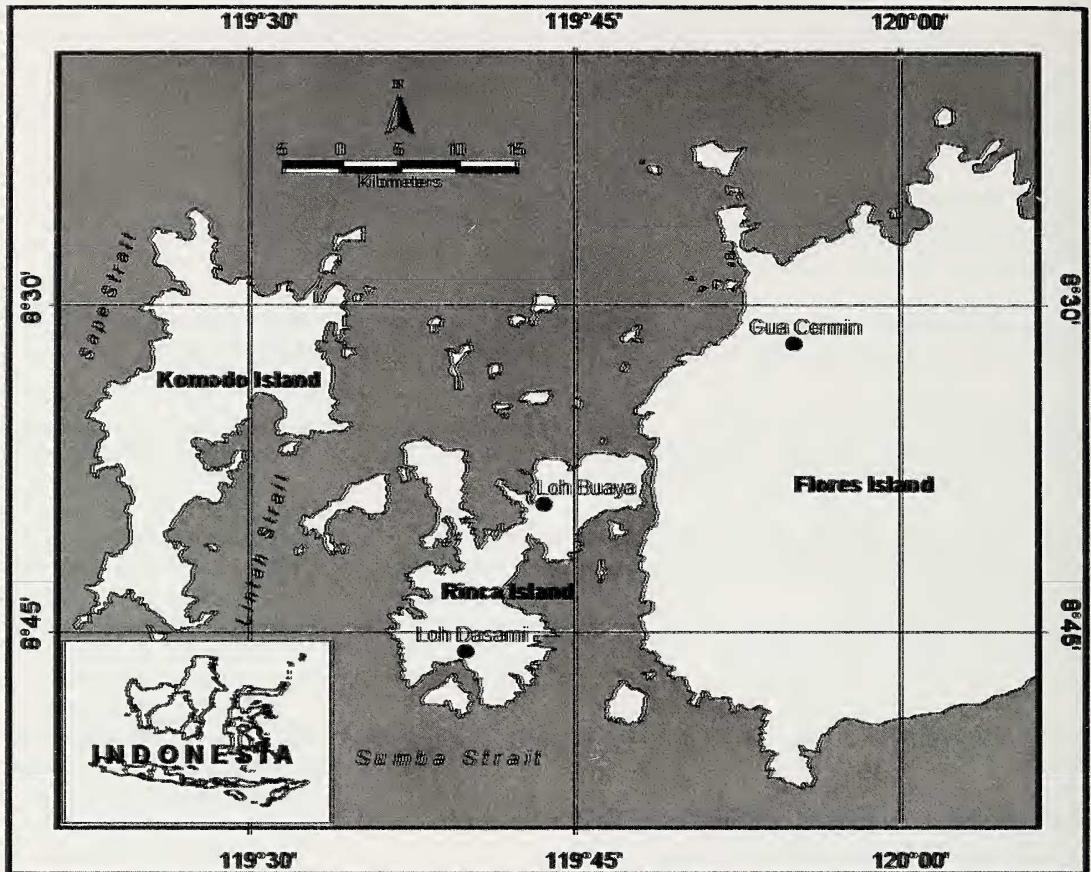


Figure 1.—Map showing the distribution of *Phrynus exsul* in Flores and Rinca Islands, Indonesia.

SYSTEMATICS

Family Phrynidae Blanchard 1852
 Subfamily Phryinae Blanchard 1852
 Genus *Phrynus* Lamarck 1801

Type species.—*Phalangium palmatum* Herbst, in Lichtenstein & Herbst 1797, by subsequent designation of Karsch (1879).

Remarks.—Members of the genus *Phrynus* have five principal spines on the pedipalpal patella and those of *Paraphrynus* have six principal spines (Weygoldt 1996). *Phrynus* is also distinguished from *Paraphrynus* by the relative length of the dorsal spines on the pedipalpal patella. *Phrynus* has a single spine between the two longest spines and *Paraphrynus* has two spines between the two longest spines. *Acanthophrynus* is distinguished from *Phrynus* and *Paraphrynus* by the presence of leaf-like setae on tarsus I that are lacking in *Phrynus* and *Paraphrynus*.

Phrynus exsul Harvey 2002

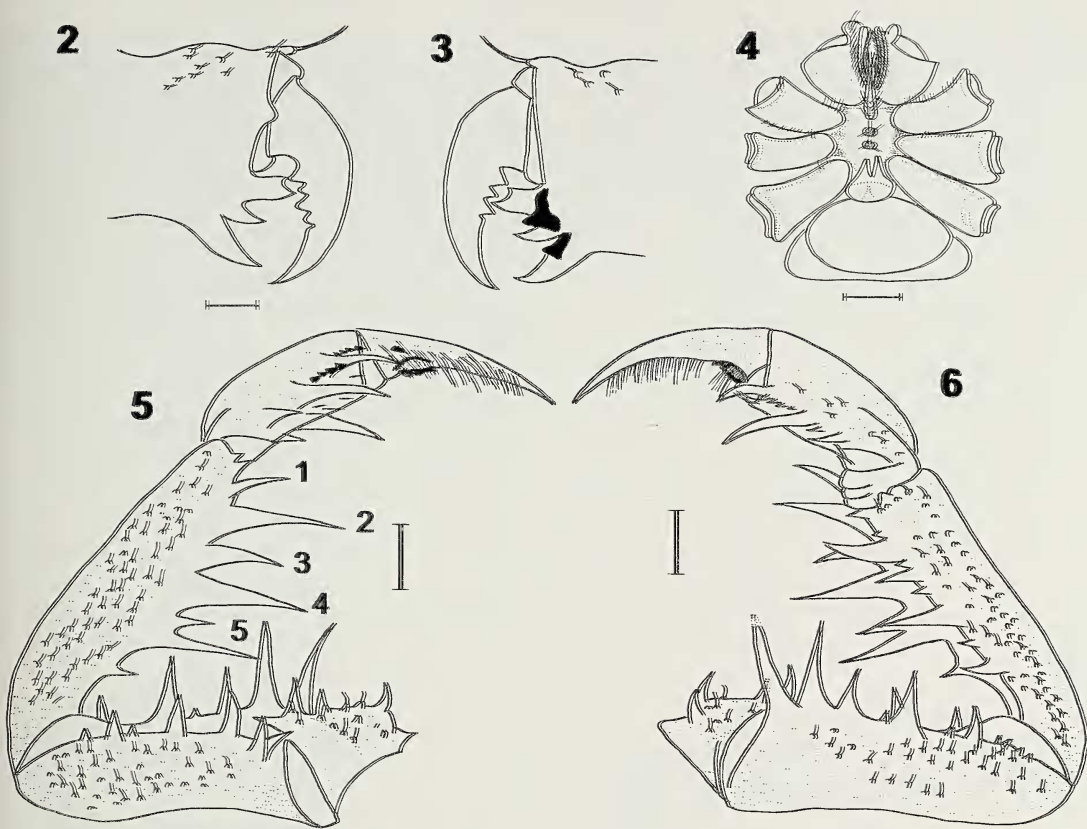
Figs. 1–10

Phrynus exsul Harvey 2002:471–473, figs. 1–6.

Material examined.—INDONESIA: *Nusa Tenggara Timur*: 1 ♀ (carrying eggs), Loh Dasami, Rinca Island, Komodo Island National Park, 8°46'21.3"S, 119°39'47.4"E, 14 August 2005, Arif Nurmawan (MZB, Ambl. 0107); 1 ♂, Loh Buaya, Rinca Island, Komodo Island National Park, 8°39'08.5"S, 119°43'12.1"E, 23 September 2005, Arif Nurmawan (MZB, Ambl. 0108).

Diagnosis.—*Phrynus exsul* differs from other species of *Phrynus* by the increased number of trichobothria on the distitibia, especially sbc and stf, which each have 5 trichobothria (Harvey 2002).

Description.—*Female*: Color: carapace, pedipalps and legs reddish-brown; tergites yellowish-brown; femur of legs have yellow



Figures 2-6.—Female *Phrynus exsul* from Loh Dasami: 2. Left chelicera, internal view; 3. Left chelicera, external view; 4. Cephalothorax and abdomen, ventral view; 5. Left pedipalp, dorsal view; 6. Left pedipalp, ventral view. (Scale bars: Figs. 2, 3 = 1 mm; Figs. 4-6 = 2 mm)

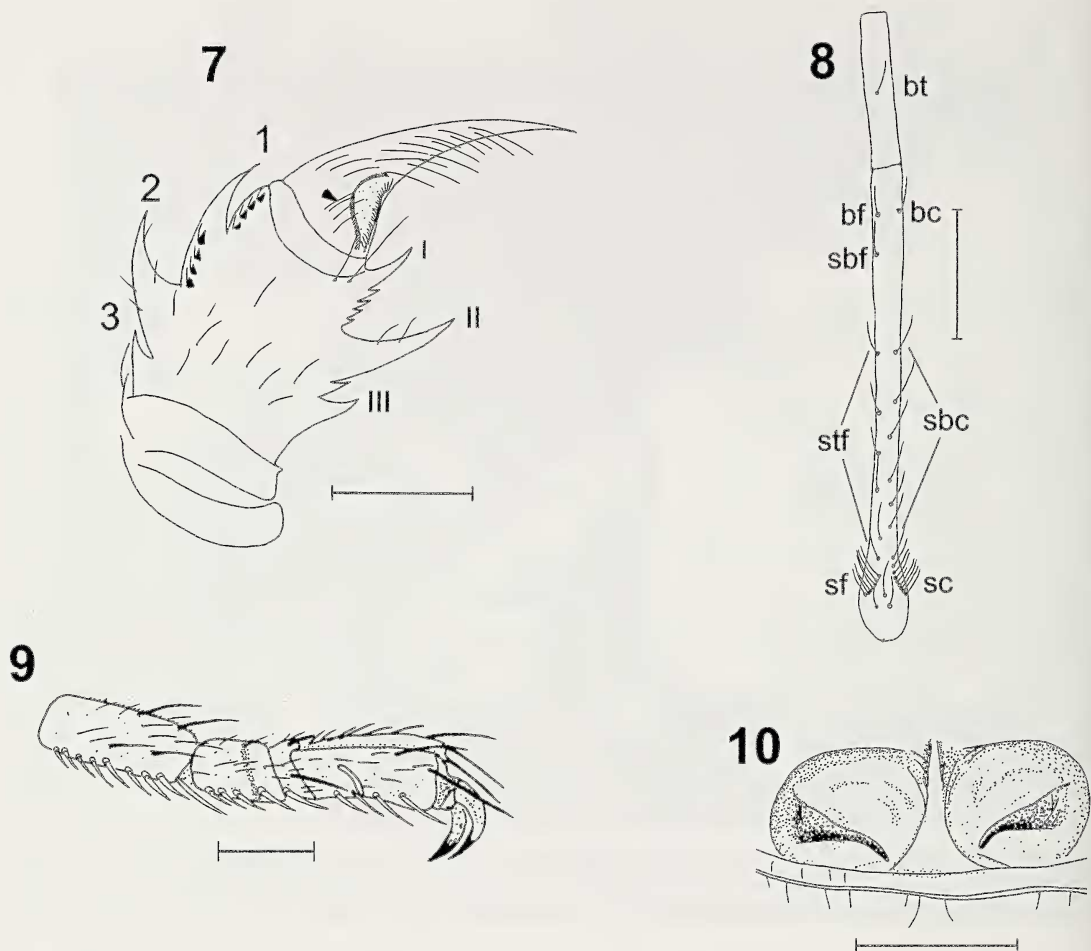
annulations, 3 brown and 2 yellow, clearly defined on leg IV. All seta acicular.

Carapace: anterior margin slightly concave, with several setiferous tubercles, eye tubercle black with eyes slightly facing antero-lateral margin, surface with many setiferous tubercles and small tubercles without setae, long sulcus present running from posterior to median eye to center of sulcus, 2 small sulci present on either side of long sulcus, central sulcus deep and radiating; frontal process concealed from above.

Chelicera (Figs. 2, 3): antero-dorsal surface of left chelicera on basal segment with well-developed setiferous tubercle on outer edge and some small setiferous tubercles, basal segment on internal margin with 3 teeth, the dorsalmost tooth bicusped, the lower cusp larger than the upper cusp, the lowermost the largest, the external margin with 3 teeth and 2 teeth on common base, movable hand with 4 large teeth and 1 very small tooth.

Sternum (Fig. 4): sternum tripartite and each sternite not expanded, anterior sternite with two stout distal setae, numerous smaller setae clustered on basal third, median and posterior sternite with 3 small setae.

Pedipalp (Figs. 5-7): pedipalps stout; trochanter antero-ventral with 4 major spines, antero-dorsal with 3 major spines and some setiferous tubercles; femur on antero-dorsal margin with 4 major spines and 2 minor spines, 5 major spines and 4 minor spines on antero-ventral margin, small bifid spine on distal edge; patella with 5 major spines and 2 minor spines on antero-dorsal margin, spine 5 with basal sub-spine about half of long major spine, spine 2 the longest and spine 1 the shortest, 4 major spines and 5 minor spines on antero-ventral margin; tibia with 3 spines on antero-dorsal margin, 4 denticles on upper spine 1, a row of 4 denticles on basal half of spine 1, antero-ventral margin with 3 spines, spine 2 the longest, 4 denticles between spine



Figures 7-10.—Female *Phrynus exsul* from Loh Dasami: 7. Left pedipalpal tibia, ventral view; 8. Left distitibia of leg IV; 9. Tarsus of left leg IV; 10. Female gonopods, dorsal view. (Scale bars: Figs. 9, 10 = 1 mm; Figs. 7, 8 = 2 mm)

1 and 2 and 1 denticle between spine 2 and 3; tarsus with single minute spine situated on dorsal surface of cleaning organ, cleaning organ with ventral row of long setae and dorsal row of smaller setae, apotele completely fused to tarsus (Fig. 7)

Legs (Figs. 8, 9): femora I, II, III and IV with small scales, distally pointed. Leg I with 30 tibial segments, 63 tarsal segments; femur I 2.38 times longer than carapace; femora II, III and IV with small tubercles and spines; tibiae II and III with 2 segments; tibia IV with 4 segments, third segment with 1 trichobothrium, bt (0.47), fourth segment (distitibia) with 35 trichobothria (Fig. 8), bc (0.10), bf (0.10), sbf (0.17), stf₁ (0.38), stf₂ (0.53), stf₃ (0.62), stf₄ (0.49), stf₅ (0.79), sbc₁ (0.39), sbc₂ (0.49), sbc₃ (0.56), sbc₄ (0.64), sbc₅ (0.70),

sbc₆ (0.75), number of trichobothria reduced in sf and increased in sbc compared to male specimen, distitibiae II and III with the same arrangement and number of trichobothria; tarsi legs II, III and IV with 4 segments, second segment with light transverse line on distal end, last segment with oblique slit; pulvilli absent (Fig. 9).

Genitalia (Fig. 10): female gonopod with claw-like sclerites, each hard and dark.

Measurements of female and male (mm) (male in parenthesis): Body length 28.00 (19.50). Carapace: median length 9.75 (6.25), width 14.5 (9.35), Median eyes to anterior margin 0.65 (0.4), lateral eyes to lateral eyes 4.60 (3.00), to anterior margin 2.00 (1.05), to lateral margin 2.00 (1.25). Pedipalps: trochanter length 4.50 (2.25), width 2.50 (1.60), fe-

mur length 9.00 (4.75), width 3.25 (2.40), patella length 9.50 (5.75), width 3.00 (2.80), tibia length 5.00 (3.00), width 2.50, tarsus length 5.00 (3.00). Leg I: femur 23.25 (15.00), patella 2.00 (1.00), tibia 43.00 (29.00), tarsus 54.50 (36.00). Leg II: femur 15.50 (10.00), patella 3.00 (1.50), basitibia 16.00 (9.00), distitibia 6.25 (4.50), metatarsus and tarsus 4.50 (2.75). Leg III: femur 4.50 (10.20), patella 3.00 (2.00), basitibia 17.50 (10.00), distitibia 7.25 (5.00), metatarsus and tarsus 5.00 (3.00). Leg IV: femur 14.50 (9.75), patella 2.75 (1.50), basitibia 16.00 (9.75), distitibia 7.00 (4.75), metatarsus and tarsus 5.00 (3.25).

Remarks.—The female of *P. exsul* is similar to the male from Loh Buaya and to the males originally recorded from the cave near Labuhan Bajo, Flores by Harvey (2002). The female differs from the males as the pedipalpal trochanter has 3 spines on the anterodorsal margin (4 spines in the males), and 4 spines on the anteroventral margin (5 spines in the males). Also, spine 5 on the dorsal margin of the pedipalpal patella of the female has the basal sub-spine about half the length of the major spine; this sub-spine is absent in the male. The presence of a basal sub-spine in spine 5 of the female specimen requires further investigation to determine if it represents sexual dimorphism or simply individual variation, as further female specimens are still unavailable.

The female gonopod is equipped with a hard, dark, claw-like sclerite, similar to that found in other phrynids (Weygoldt 1999; Perreti 2002), and which is considered to be autapomorphic for Phrynidae (Weygoldt 2000). The morphology of the female gonopods in Phrynidae shows very little variation between genera or species (Mullinex 1975; Quintero 1981; Weygoldt 1999, 2000).

Phrynus exsul was initially found in a cave near Labuhan Bajo, Flores, where they were reported to be very abundant (Harvey 2002). The two specimens from Rinca Island were taken from epigeal habitats indicating that *P. exsul* is not an obligate cavernicole. The female was found on a tree trunk in the rainforest and the male was collected on a rocky cliff. Several species of *Phrynus* are known to be troglomorphic, living both in caves and in epigeal habitats; the majority occur in epigeal habitats. No strictly cavernicolous species of *Phrynus* are known, in contrast to *Pa-*

raphrynus in which several troglomorphic species are known (Mullinex 1975, 1979; Quintero 1981).

Distribution.—*Phrynus exsul* was first recorded from Gua Cermin, Labuhan Bajo, Flores and is here recorded from Rinca Island, a part of Komodo Island National Park, situated slightly to the west of Flores Island (Fig. 1). The species may be more widely distributed within the Lesser Sunda Islands.

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